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(54) Abstract Title

Spring mounting for sash window counterbalance

(57) The spring support mounting for at least two coiled ribbon springs counterbalancing the weight of a sash window, comprises a single integral component 24 dimensioned to fit within a jamb channel. Projections 33, 35, 37, some of which may be triangular in shape, support the springs (22a-c, figure 5). Also disclosed are a curved head portion for mounting the support, support wing projections, engagements means for a sash shoe, positioning of the springs for rapid recoil and buffer means.

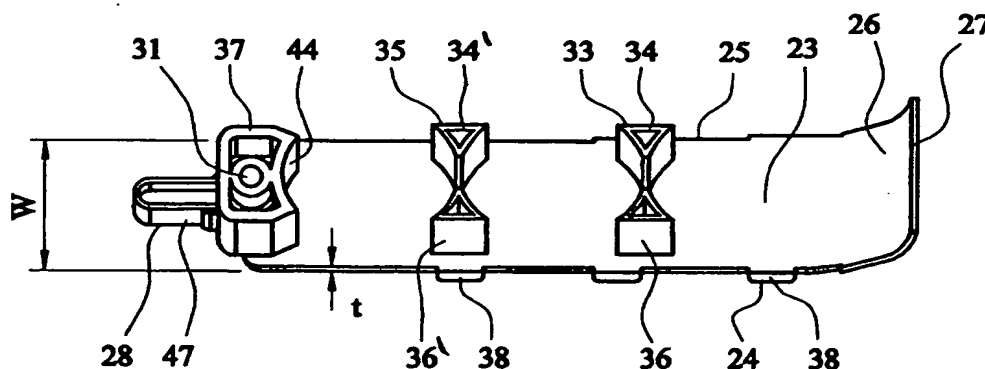


FIG. 4

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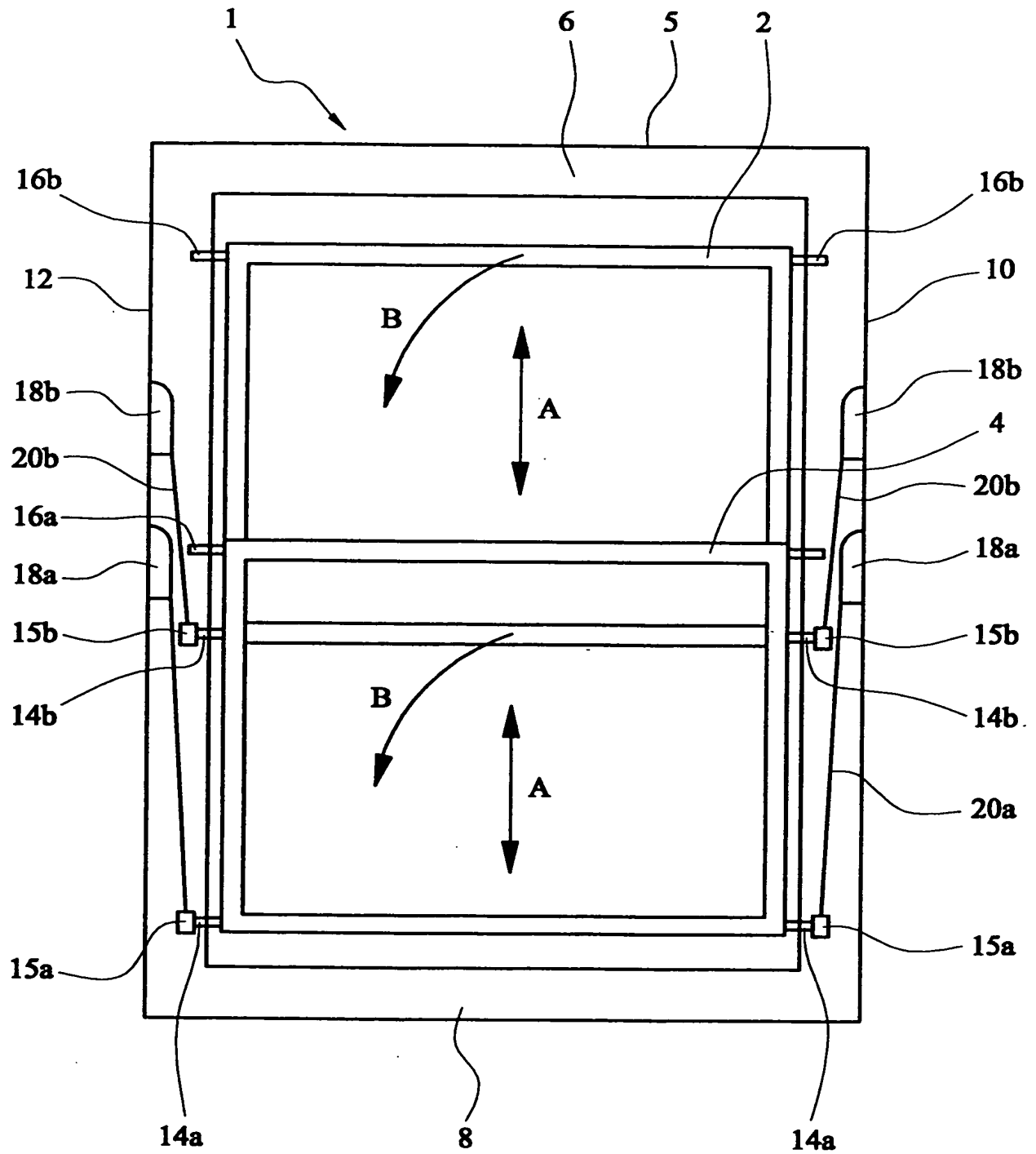


FIG. 1

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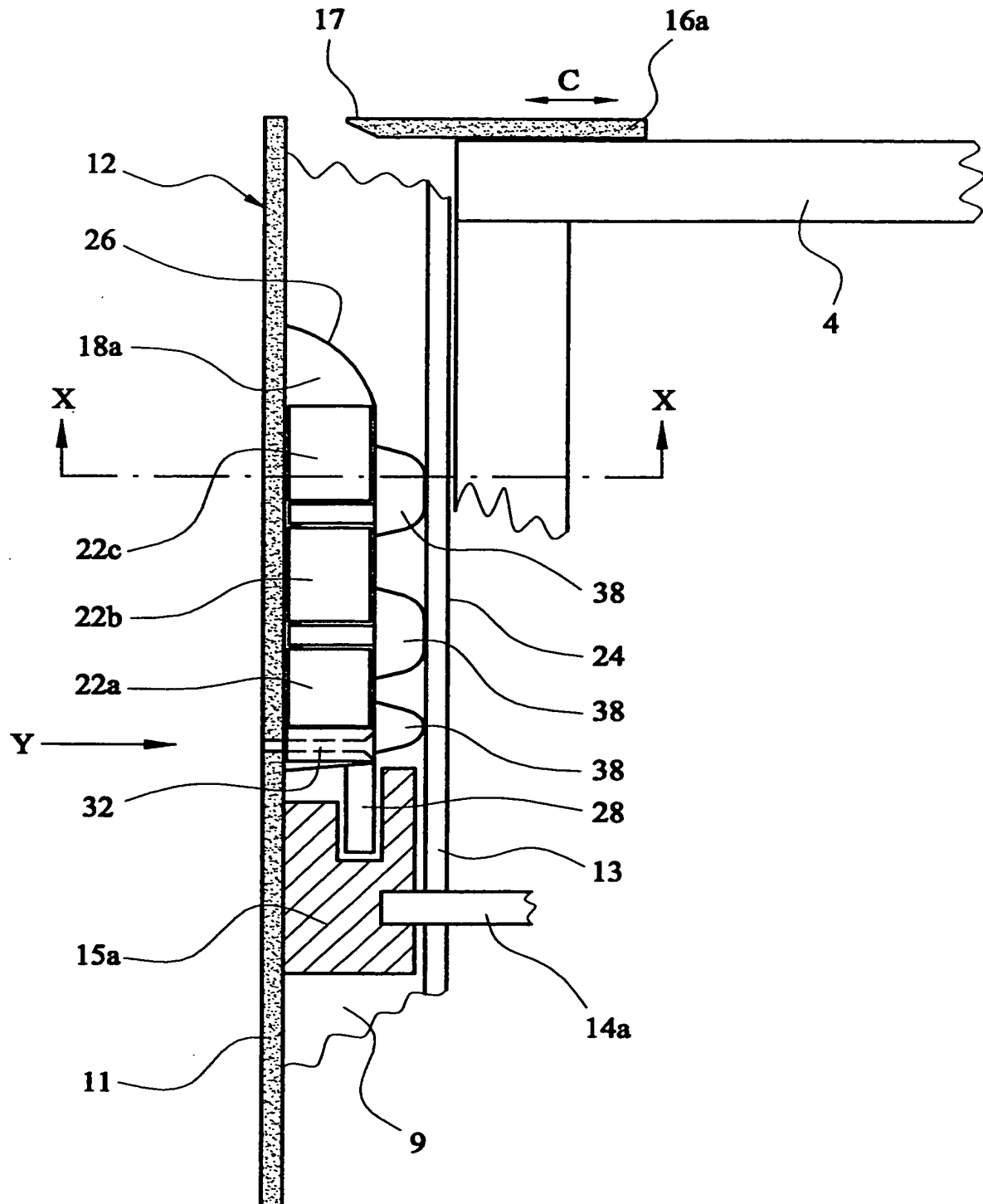


FIG. 2

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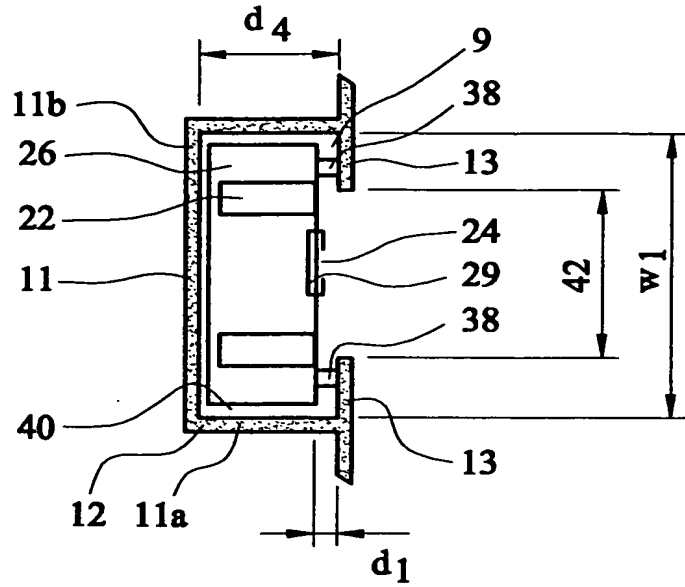


FIG. 3

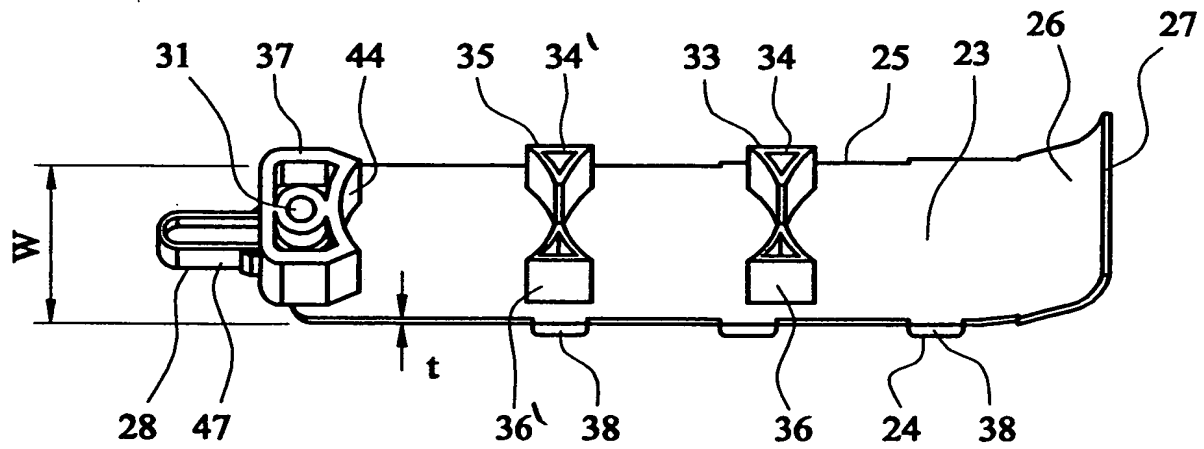


FIG. 4

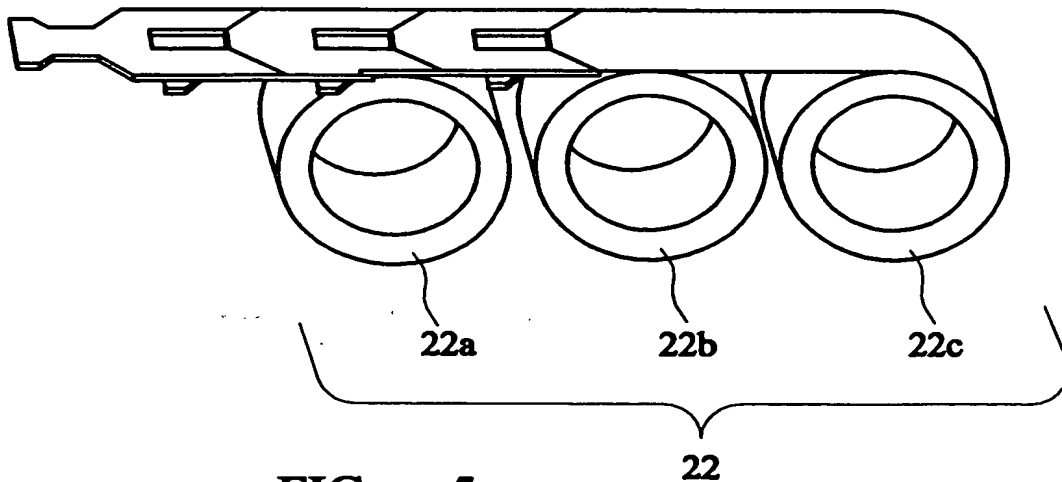
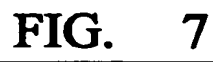


FIG. 5

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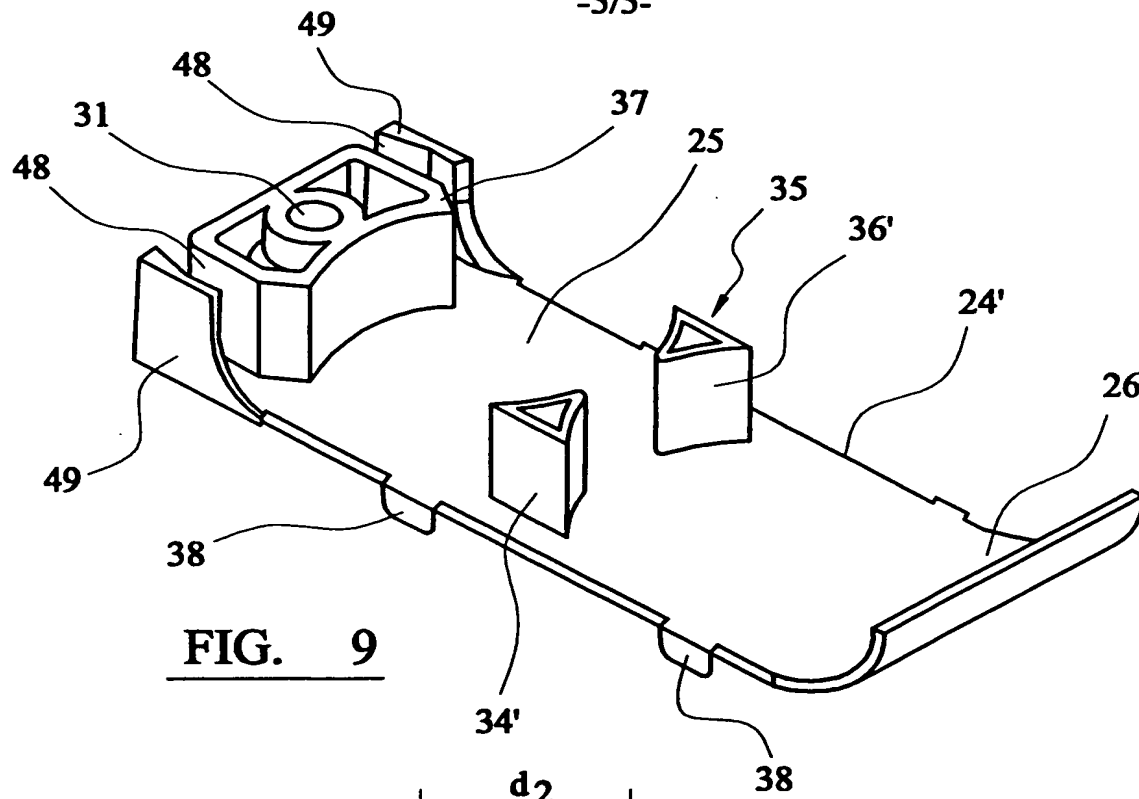


FIG. 9

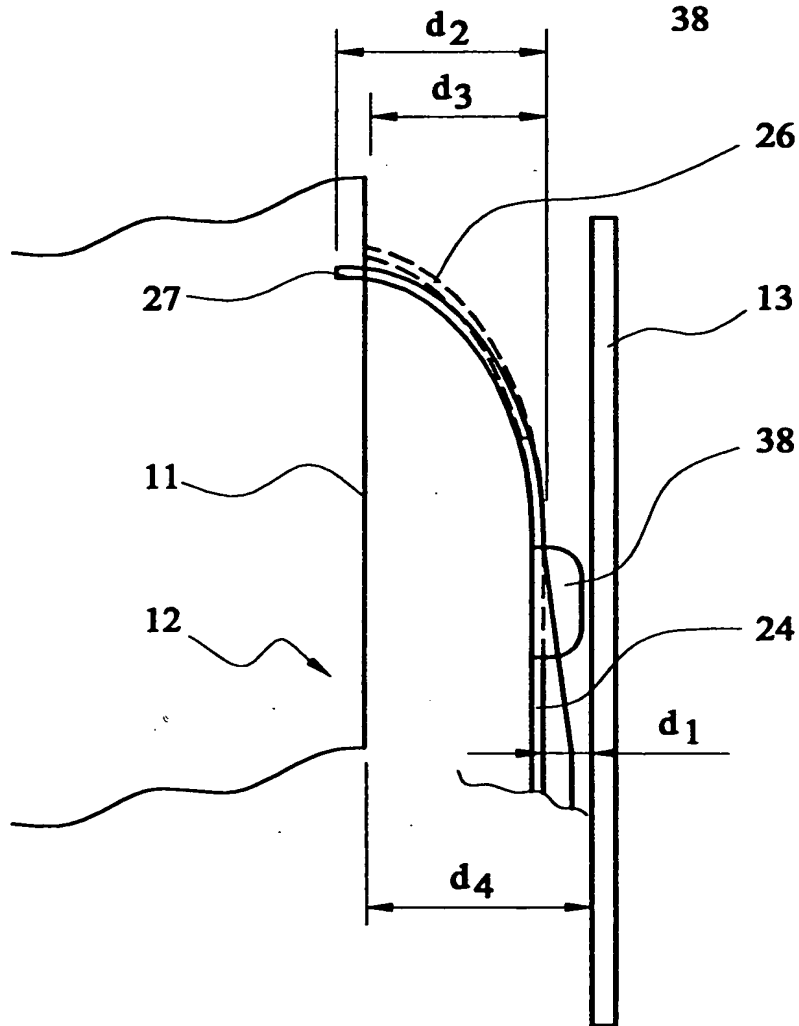


FIG. 10

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SPRING MOUNTING FOR SASH WINDOW TENSIONING ARRANGEMENTS

The present invention relates to sash windows and in particular to a mounting for the spring tensioning arrangement used in such sash windows.

Modern sash window arrangements utilise flat coiled ribbon springs which are arranged to unwind as the sash is slid and moved within a window frame. The coiled springs provide a counterbalancing force to counterbalance the weight of the sash window thereby making movement, and opening of the window easier. Typically the coiled springs are mounted, via a mounting arrangement, within a vertical channel section of the window frame or jamb. A free end, referred to as a tail, of the spring is connected to a sash shoe slidably mounted within the channel section of the window frame. The shoe in turn is then connected to the sash window jamb, usually towards the lower portion of the sash window.

The coil springs are generally of a constant tension type in which the outer profile of the coil itself is rotatably held and supported within the mounting whilst the other free end of the spring is free such that the coil spring can rotate as the spring is unwound and the tail is extended. To provide sufficient force to counterbalance the weight of the sash window multiple springs may be provided with the free ends or tails connected together.

An example of a prior arrangement, as generally described above, for a mounting for multiple springs for use in a sash window is described in US patent number 5,365,638. As described in this prior patent, individual mounting means are provided for each of the coil springs. The spring mounting comprises two parallel arranged upstanding wall portions with a coil spring support element interconnecting these wall portions. The coil spring is inserted in between the wall portions with an outer coil surface of the spring

supported and resting on the coil spring support element/surface. To provide a multiple spring assembly a number of individual mounting means are provided and stacked into an assembly in the window jamb.

5 Whilst this mounting arrangement, and similar prior arrangements, provide a practical method of mounting and supporting the springs, there are a number of problems with such an arrangement and the mounting arrangement can be improved generally. Particular problems are that the
10 individual mounting for the springs are relatively complex and involve a number of different components. This increases production costs. The individual mountings also have to be installed individually and/or assembled which increases assembly time and costs. Installation of a stack of
15 mountings within the channel section can also in practice be difficult. The installation of the sash shoe can also be problematic, in particular due to the applied tension of the springs which are attached to them. The correct lateral location of the prior mountings within the channel section
20 and alignment of mounting can also be difficult especially due to the restricted access to the channel section. The stack of mountings secured to the jamb via a single screw fitting also have a tendency to undesirably bow under the tension of the springs. If multiple screw fasteners are used
25 to reduce this bowing then assembly time is increased. It has also been found that dirt can accumulate within the mounting assembly and springs. This can adversely affect performance and operation of the counterbalance. The prior art mountings also obstruct the channel section within which
30 the tilt latch is engaged to locate the sash. Consequently the prior art mountings have to be carefully positioned within the jambs such that opening of the window is not restricted.

35 It is therefore desirable to provide an improved sash

window spring tensioning mounting arrangement which addresses some or all the above described problems and/or which offers improvements generally.

5 According to the present invention there is provided a sash window counterbalance spring mounting arrangement as described in the accompanying claims.

 In an embodiment of the invention, which includes a number of complementary and/or separate but related aspects and features of the invention, there is provided a sash
10 window counterbalance spring mounting arrangement for fitment into a channel section within a window jamb. The arrangement comprises at least two coiled ribbon springs, a spring support mounting comprising support means for each of
15 said at least two coiled ribbon springs to support and locate said coiled ribbon springs to the spring support mounting, and locating means adapted, in use, to locate the spring support mounting within and to said channel section. The spring support mounting comprises a single integral
20 component from which the support means depend and from which the at least two springs are located and supported.

 A spring support mounting comprising a single integral component, ie of a one-piece format, for a multi spring counterbalance arrangement is much simpler to fabricate than
25 the prior multi piece format conventionally used. The single integral format is also much simpler to fit into the channel section than fitting the individual support mountings for each of the multiple springs as used in the prior art arrangements. Using a single integral support mounting
30 component also allows the multiple springs to be more closely located to each other which reduces the potential bowing of the support mounting under the spring load.

 The spring support mounting comprises an elongate plate like main body portion, the main body portion having a front
35 and rear surface. The support means comprise integral

projections from a rear surface of the main body portion. Preferably at least one of the at least two springs comprise a pair of triangular cross section integral projections which extend from the rear surface of the main body portion.

5 The triangular cross section projections are respectively disposed laterally on the rear surface with the respective triangular cross sections laterally oppositely directed such that the pair of triangular projections define a cradle for said spring.

10 Such triangular cross section projections provide a simple and convenient support mounting for the springs. Furthermore they also allow the springs to be located closely together which, as mentioned above, reduces the possibility and problems of bowing of the spring support
15 mounting.

An end portion of the main body portion of the support mounting is curved in a direction extending from the rear surface of the main body such that a tip edge of the end portion of the main body is disposed at a position spaced
20 from a plane of the remainder of the main body portion. The end portion is thereby arranged to provide a curved head portion for the spring support mounting.

Such a curved head to the spring support mounting allows a tilt latch, which engages within the channel into
25 which the support mounting is fitted, to glide over the installed spring support mounting.

When the mounting arrangement is installed within said channel section of the window jamb, the tip edge of the curved head portion is arranged to abut against a wall of
30 said channel section with the curved head portion closing of an end of the mounting arrangement.

The abutment of the tip edge of the curved head portion with a wall of the channel section and closing off of the end of the mounting arrangement assists in keeping dirt out
35 of the mounting arrangement and the coiled springs. In

addition it also, in part, seals off the channel section so reducing drafts through the channel section.

5 The curved head portion is resilient and tip edge of the curved head portion is arranged to resiliently abut against said wall of the channel section such that the spring support mounting is urged away from said wall.

10 The resilient abutment of the curved head and tip thereof ensures that there is a good seal between the tip and curved head portion. It also provides a secure means to locate the support mounting within the channel between the walls of the channel whilst also allowing the mounting arrangement to accommodate any manufacturing tolerance variations in the channel dimensions.

15 Wing projections extend from the front surface of the main body of the spring support mounting. A distal end of the wing projections are arranged, when the spring mounting is installed within the channel, to abut against a wall of said channel and to space the front surface of the main body of the spring support mounting from said channel wall.

20 The wing projections provide a means to laterally locate the support mounting within the channel section, whilst spacing the front surface from the channel wall such that a part of the cross section of the channel section is still unobstructed by the support mounting.

25 On the longitudinal end of the support mounting there are inter engagement means for cooperative engagement with cooperative inter engagement features on a sash shoe. The inter engagement means preferably comprise a finger extension which is arranged to be engaged within a cooperative recess. The finger extension extends from an end of the spring support mounting, and the cooperative recess is defined in an end portion of the sash shoe.

30 The inter engagement means between the sash shoe and spring support mounting locate and align the sash shoe and spring support mounting such that the sash shoe and spring
35

support mounting can be installed within the channel as a single unit. The alignment of the sash shoe with the spring support mounting also makes the installation of the shoe within the channel easier.

5 The support means of the spring support mounting are disposed on the spring support mounting such that in use when the at least two springs recoil rapidly an outer surface of adjacent springs contact each other.

10 By arranging the support means such that the springs contact when they recoil rapidly, a braking effect is provided which slows the recoiling of the springs.

15 An end of the spring support mounting may be provided with a buffer means for absorbing, in use, an impact of a sash shoe against said end of the spring support mounting. The buffer means may comprise coil tension springs. Alternatively the buffer means comprises a finger extension which is engaged within a recess. The finger extension and recess are profiled such that as the finger extension is inserted into the recess the finger extension and recess progressively and increasingly frictionally engage each other.

20 Such a buffer means reduces damage that may be caused in the event that the sash shoe impact the spring support mounting.

25 The spring support mounting is resiliently flexible in directions extending from the front and rear surfaces.

30 Such flexibility in the support mounting allows the support mounting to be bent during installation of the support mounting within the channel section. This allows the support mounting comprising an elongate single integral component to be inserted through an industry standard channel opening which is shorter in length than the support mounting.

35 The present invention will now be described by way of

example only with reference to the following figures in which:

Figure 1 is a schematic representation of a complete sash window assembly incorporating the counterbalance spring mounting arrangement in accordance with the present invention;

Figure 2 is a vertical cross sectional schematic view through the window jamb and counter balance spring mounting and in accordance with the invention, and as shown in figure 1;

Figure 3 is a cross sectional view in a vertical direction, on section X-X of figure 2 through the window jamb and spring mounting of the invention;

Figure 4 is a schematic perspective view of the mounting support of figure 2 but in isolation, showing the rear surface of the mounting body;

Figure 5 is a schematic perspective view of the arrangement of springs alone as arranged in the mounting of figure 2;

Figure 6 is a further schematic perspective view of the mounting body, similar to that of figure 4, but showing the facing surface of the body portion;

Figure 7 is a more detailed schematic cross sectional view on arrow Y of the mounting and sash shoe ;

Figure 8 is a similar view to that of figure 7 but showing an alternative arrangement of the mounting and sash shoe;

Figure 9 is a schematic perspective view, similar to that of figure 4, but of an alternative embodiment of the mounting;

Referring to figure 1, a sash window 1 comprises upper 2 and lower 4 sashes which are slidably mounted within a window frame 5 such that each sash 2,4 can be slid vertically to open the window. The sashes 2,4 are disposed

generally vertically and are disposed closely adjacent to each other with one sash 2 sliding behind the other 4. The window frame 5 comprises upper 6 and lower 8 horizontal frame members and two vertical laterally spaced window jamb members 10,12. The window jambs 10,12 have a double vertically extending channel section. Each channel section 9 of the double channel section is disposed side by side within the window jamb adjacent to a respective sash. Figure 3 shows the profile of each channel section 9 and the two channel sections, of the double channel section within the window jamb 10,12 are of a similar configuration and are arranged laterally adjacent to each other to form the double channel section of the window jamb 10,12. The open side of each respective channel section 9 extends vertically adjacent to the respective sides of the sashes 2,4. The channel section 9 comprises rear wall 11 facing outwardly towards the sash 2,4 from which extend two side walls 11a,11b. Short front wall portions 13 generally parallel to the rear wall 11 extend inwardly from the ends of the side walls 11a,11b towards each other to partially close off and defining a channel or jamb pocket 40 with an opening 42 of the channel 9 of a smaller dimension adjacent to the sash 2,4. Along a small section (typically 50mm) of the channel section 9 however the front wall members 13 are removed to provide an enlarged access opening (not shown) into the channel section 9. Such an opening in the channel section 9 is an industry standard and is to allow a spring assembly 18a,18b and sash shoe 15a,15b to be inserted into the channel section 9.

Pivot pins 14a,14b, located towards the lower end of each sash 2,4, extend laterally from each lateral side of each sash 2,4. The pivot pins 14a,14b extend into a respective channel section 9, through the open side and opening 42 in the channel section 9 and are pivotally engaged within a sash shoe 15a,15b which is slidably located

within a respective channel section 9 of the window jamb 10,12. Tilt latches 16a,16b, located towards the upper part of each sash 2,4, similarly extend laterally from each lateral side of each sash 2,4 with a tip 17 of each tilt latch 16a,16b extending into a respective channel section 9 of the window jamb 10,12 through the open side 42 of the channel section 9. The pivot pins 14a,14b, sash shoe 15a,15b, and tilt latches 16a,16b, thereby slidably locate the sashes 2,4 within the respective channel sections 9 of the window jambs 10,12 and secure the sashes 2,4 within the window frame 5.

The tilt latches 16a,16b are arranged to be retracted, as indicated by arrow C, into the sash 2,4, such that the tip 17 of the tilt latch 16a,16b can be withdrawn from the respective channel section 9 of the window jamb 10,12. The sash 2,4 can then be pivoted about the pivot pins 14a,14b, as indicated by arrow B. This allows, when the sash window is installed, access to the other side of the window for cleaning and other purposes.

To counter balance the weight of the sashes 2,4, and assist in the vertical sliding of the of sashes 2,4, a counterbalance mechanism is provided. The counter balance mechanism for each sash 2,4 comprises a pair of spring assemblies 18a,18b mounted in and to the window jambs 10,12, and specifically within the respective jamb channel and jamb pocket 40, on each lateral side of the sash 2,4. Each spring assembly 18a,18b comprises a number of flat coiled ribbon springs 22a,22b,22c which are supported and mounted to the window jamb 10,12 via a spring assembly mounting 24, as will be described in more detail later. The free outer ends, or tails, of each coiled spring are connected together to form a common tail 20a,20b which is drawn out from the spring assembly 18a,18b along the channel section 9 of the window jamb 10,12 and is connected to a respective sash shoe 15a,15b. As the sash 2,4 slides vertically within the frame

5 the common tail 20a,20b is drawn out and retracts into the spring assembly 18a,18b with the coil springs 22a,22b,22c uncoiling and coiling within the spring assembly 18a,18b. As a result a vertical upward force is provided by the springs
5 22a,22b,22c to counterbalance the weight of the sashes 2,4 and assist in the vertical sliding movement of the sashes 2,4. The spring assemblies 18a,18b for each sash 2,4 are located at vertical positions within and along the window jamb 10,12 such that over the full sliding movement of the
10 sashes 2,4 the springs 22a,2b,22c are extended to some degree and are under tension to provide a positive vertical upward force over the entire range of sliding movement of the sashes 2,4. Typically therefore, and since the tails 20a,20b of the springs 22a,22b,22c are connected to sash
15 shoes 15a,15b towards the lower end of each sash 2,4 the spring assemblies 18a,18b are generally mounted towards the middle of the window jambs 10,12.

An individual spring assembly 18a, in this case for the left hand side of the lower sash 4, is shown in more detail
20 in figures 2 to 7. The other spring assemblies 18a,18b which are located in a different respective positions in the window jambs 10,12 and are connected to a respective sash 2,4 via a respective sash shoes 15a,15b are generally similar. Consequently only this spring assembly 18a will be
25 described in detail.

The spring assembly 18a comprises a one piece multi spring support mounting 24 which is dimensioned to fit into and within the channel section 9 of the window jamb 12 with the width W of a main body portion 25 corresponding to the
30 approximate width W_1 of the jamb channel 9 within which it is inserted. The spring support mounting 24 is shown on its own more clearly in figures 4 and 6. The spring support mounting 24 comprises a plate like generally rectangular main body portion 25 with a front surface 21 which when
35 installed in the jamb 12 faces outwards from the window jamb

channel section 9, and a rear surface 23 which faces towards and into the jamb channel section 9. Integral with the main body portion 25 and extending from the rear surface 23 thereof are spring support projections 33,35,37 disposed at spaced positions along the length of the main body portion 25 of the spring support mounting 24.

Three flat ribbon coiled springs 22, lower 22a, middle 22b and upper 22c (as considered in their final installed positions shown in figure 2) are arranged as shown in figure 5 with the outer free ends or tails of each spring connected together to form a common tail 20a. The springs 22 are located within and on the spring support mounting 24. The outer coiled body portions of the three flat coiled ribbon springs 22 are supported by and on the respective spring support projections 37,35,33 of the spring support mounting 24. An axial end of the coil springs 22 abuts against the rear surface 23 of the main body portion 25 of the support mounting 24. Since the other axial end of the coil springs is not enclosed by the support mounting the springs 22 can be fitted into the support very easily. Once the spring assembly 18a, (support mounting 24 and springs 22) is installed into the jamb 12 and channel section 9, the exposed axial end of the spring is however then enclosed by the rear wall of the channel section which once the assembly 18a is installed prevents the springs 22 from sliding axially off the support projections 33,35,37.

The inner free ends of the flat ribbon coil springs 22 are generally free such that as the springs 22 unwind they rotate within the spring support mounting 24 and the springs 22 provide a generally constant force as there are, in use, unwound.

The lower spring support projection 37 (shown to the right of figure 4) is of a generally rectangular section with one side of a curved/bowed profile to define a curved cooperating support surface 44 for the outer profile of the

lower coil spring 22a.

The centre support projection 35 comprises a pair of triangular cross section projections 34',36' disposed on either side of the rear surface 23 of the main body 25. The triangular cross section projections 34',36' are arranged with a base side of the triangular section generally parallel to the longitudinal edge of the main body 25 and with an apex towards the centre of the main body 25. The triangular projections 34',36' are separated such that there is a space between the respective projections 34',36' in the centre of the main body 25. The pair of triangular projections 34',36' thereby define a cradle within which the outer profile of the middle spring coil 22b is located and is supported. The shape of the triangular projections 34',36' may preferably be profiled to cooperate with the outer profile of the spring 22b, however exact correspondence in profile is not required to provide support for the spring 22b. The centre support projection 35 is also adjacent to the lower coil spring 22a and so prevents movement of the lower spring 22a in an upwards direction when installed. In effect the triangular projections 34',36' occupy the generally triangular space between adjacent springs 22a,22b to thereby locate these springs 22a,22b within the mounting 24 and support the springs 22a,22b when the assembly 18a is installed.

The upper support protection 34 is the same as the centre support projection 35 and the upper spring 22c is supported by one side surface of the respective triangular projections 34,36 whilst the centre spring 22b is also adjacent to the lower side surface of the triangular projections 34,36.

It will be appreciated that the number of springs may be different in other embodiments of the invention depending on the counterbalance force that is required and additional, or fewer support projections can be provided. For example in

figure 9 a support mounting of the same general type (in which like reference numerals have been used for like features) as that of figure 4 is shown but for mounting two springs 22. The invention however and its advantages are though particularly and mainly applicable to multiple spring mountings which include and provide a mounting for a minimum of two springs.

With the triangular projections 34,34',36,36' located towards the sides of the main body 25, and by virtue of the one piece format for the support mounting 24, the springs 22 are located relatively close together along the support structure 24. Indeed the springs 22 can with this support mounting 24 be located such that when fully wound, and of a maximum diameter, the outer profile of adjacent springs 22a,22b and 22b,22c almost touch in the centre space between the triangular support projections 34,34',36,36'. As a result the overall length of the spring assembly 18a is considerably less than that of previous arrangements incorporating similar sized springs. In addition bowing of the support mounting 24 due to the spring 22 loads is reduced.

It has also been found that when coil springs 22 of the type used retract and rewind quickly, for example if the load of the sash window is suddenly removed or the window is moved upward quickly, then the outer diameter of the coil spring 22 expands to a diameter greater than that of the naturally coiled spring or present under normal recoiling of the spring 22 under slower movement. With this support mounting the springs 22 can be arranged such that when they quickly retract the outer profile of the adjacent springs 22a,22b and 22b,22c contact each other and for the lower 22a and middle 22b springs they contact the adjacent triangular supports 35,33 for the adjacent springs 22b,22c. This contact advantageously brakes the retraction of the springs 22 and slows the retraction and movement of the sash 2,4.

The contact between adjacent springs 22a,22b and 22b,22c provides a particularly efficient braking action since respective opposite sides of the springs 22, which are moving in opposite directions at the point of contact, contact each other.

The spring support mounting 24, as shown in figure 4, is preferably made of a relatively flexible plastic material, for example nylon or acetyl. The spring support mounting 24, including integral spring support projections 37,35,33, is fabricated as a single piece construction preferably by injection moulding. The one piece format of the support mounting 24 simplifies assembly by reducing the number of parts involved and also reduces production and assembly costs. In particular such a one piece unit is cheaper to fabricate than having to make a number of, generally different individual support mountings for the individual springs.

The main body 25 of the support mounting 24 is relatively thin t, typically about 1 mm. Consequently the main body portion 25, of spring support mounting 24 is relatively flexible and can be bent to allow the spring assembly 18a, which overall is longer than the typical 50mm length of the access opening in the channel section 9, to be inserted through the industry standard 50mm access opening (not shown) in the channel section 9 of the window jamb 12. The spring assembly 18a is then slid down within the channel section 9 to the correct position. The flexibility of the support mounting 24 of the present invention and one piece format, means that the support is simpler to manufacture and install into the channel section 9 of the jamb 12 as compared to the prior arrangement. This can be contrasted with prior arrangements, for example as shown in US 5,365,638, in which the support mountings are of a rigid plastic multi piece construction with each piece of the support required to be small enough to be individually

inserted through the access opening and then connected together once installed into the channel.

Wing projections 38 located at the edges of the main body 25 of the support mounting 24 and integral with the support mounting 24 extend from the front surface 21 of the support mounting. When the support mounting 24 is installed and fitted into the channel section 9 of the jamb 12 these wing projections 38 bear against the rear of the front walls 13 of the channel section as shown in figure 3. The wing projections 38 thereby provide a means to locate the support mounting 24 within the channel section 9. The wing projections, being fabricated from the same flexible plastic material as the rest of the support mounting 24, are also flexible enough to bend slightly and accordingly take up any manufacturing tolerance variations in the dimensions of the channel section 9. The wing projections 38 also space the front surface 21 of the support mounting 24, a distance d_1 away from the channel opening 42 such that a recess is still defined in the region of the mounting 24 to allow the tip 17 of the tilt latch 16a which extends into the channel section 9 to remain engaged within the channel 9 as it passes over the mounting 24. A longitudinal groove indentation 29 is also provided and defined within the front surface 21 of the mounting 24 to similarly maintain engagement of the tip of the tilt latch within the channel 9 and jamb 12 over the length of the mounting 24.

The end portion of the main body 25 of the support mounting 24 (when installed the top end of the support mounting) is curved away from the rear surface of the support mounting in a direction extending from the rear surface to provide a curved head 26, with in effect the end portion 26 being curved longitudinally back upon the remainder of the main body 25 of the rear surface 23 of the support mounting 24. The curved head portion 26 curving and bowing back towards the support projections 33 and closing

off that end of the support mounting 24. The tip edge 27 of the curved head is therefore disposed a distance d_2 from the front surface 21, and rest of the main body 25 of the support mounting 24. Preferably this distance d_2 is slightly greater than the depth d_4 of the channel section 9 within which the support mounting 24 is fitted. When the support mounting 24 is fitted into the channel section 9, and since the main body 25 is relatively flexible, the curved head portion 26 is bent and straightened slightly such that the tip edge 27 is a closer distance d_3 from the rear surface 23 and rest of the main body 25 of the support mounting 24. This allows the support mounting 24 to fit into the channel section 9. This is shown in exaggerated form in figure 10 with the normal free position 26' of the curved head 26 indicated in phantom. As a result of this bending of the curved head portion 26 when installed, the tip edge 27 of the curved head 26 resiliently presses against the rear wall 11 of the jamb 12 channel section 9. This urges the front surface 21 and main body 25 of the support mounting 24 outwards and presses the wing projections 38 against the inner surfaces of the front walls 13 of the channel section 9. The support mounting 24, and in particular top end of the mounting 24, is thereby located relatively securely between the front 13 and rear walls 11 of and within the channel section 9 of the jamb 12. The resilience and bending of the curved head 26 accommodates any manufacturing tolerances within the depth d_4 of the channel section 9. The curved head portion 26 and abutment against the channel section 9 wall 11 when the support mounting 24 is installed also provides a tight seal within the channel section 9 which reduces drafts. The curved head 26 also encloses the top of the spring assembly 18a with the springs 22 enclosed by the curved head 26, main body 25, and channel section 9 walls of the jamb 12. As a result dirt, which may interfere with the springs 22 is kept out of the assembly 18a and the springs

22 are protected to some degree.

The curved head portion 26 also deflects the tilt latch 16a into the sash allowing the tilt latch 16a to glide over the mounting 24 as the sash 2,4 is moved. It being appreciated that the tilt latch 16a normally extends a considerable distance into the channel section 9 to provide a secure and robust location of the top of the sash 2,4. When passing over the support mounting 24 the tilt latch 16a is still though engaged within the channel section 9 and jamb 12 due to the spacing d_1 of the support mounting 24 from the front walls 13 by the wings 38 and due to the groove 29 formed within the front surface 21 of the support mounting 24. The lower end of the support mounting may also preferably be of a curved profile to allow the tilt latch 16a to glide over the support mounting 24 when the sash 2,4 and tilt latch 16a,16b are moved over the support mounting 24 from the below the support mounting 24.

The lateral location and positioning of the support mounting 24 within the channel section 9 itself, as opposed to the vertical position, is provided by the abutting of the wing projections 38 with the front wall 13, the bearing of the tip edge 27 of the curved head 26 against the rear wall 11 and the width W of the support mounting 24 with the longitudinal edges abutting the side walls 11a,11b of the channel section 9. However to locate the support mounting 24 vertically along the channel section 9 and to secure the support mounting 24 to the jamb 12 an aperture 31 is defined within the lower support projection 37. A single mounting screw 32, is engaged within this aperture 31 and, when the spring assembly 18a is fitted into the jamb 12 this secures the spring support mounting 24 as a whole to the window jamb 12. Since the width W of the support mounting 24 corresponds generally to that W_1 of the channel section 9 the support mounting 24 is restrained from rotating about the single screw 32 fitting. The one piece format of the support

mounting 24 for supporting multiple springs 22 enables the single screw 32 fitting to secure the support mounting 24 to the jamb 12. This can be contrasted with some prior arrangements in which individual mounting structures which are individually secured to the jamb are used. The use of a single fixing screw 32 represents a simplification and reduces assembly and installation time.

The support mounting 24 may in alternative embodiments be secured and located vertically within the channel section 9 and jamb using pegs, spigots or catches instead of the single screw fastening described and shown. The screw fitting 32, or other securing means may also locate the support mounting 24 against the rear wall 11 of the channel section 9 and within the channel section 9 in other embodiments, and in particular in other embodiments which do not include the curved head 26 and/or wing projections 38.

The support mounting 24 also includes an integral finger extension projection 28 which extends from an end of the main body portion 25. This finger 28 is engagable within a cooperatively shaped recess 46 within the sash shoe 15a to which the tails 20a of the springs 22 are attached and which is located beneath the spring assembly 18a within the channel section 9 of the window jamb 12. This finger extension projection 28 provides a means to locate the sash shoe 15a relative to and with the spring assembly 18a such that both the shoe 15a and spring assembly 18a can be inserted into the channel section 9 together as a single unit. This aids assembly and furthermore makes it easier to slide the sash shoe 15a to the correct position since the spring assembly 18a provides a means for more easily guiding the sash shoe 15a within the channel section 9. The finger 28 also, by locating the sash shoe 15a relative to the spring assembly 18a holds and locates the sash shoe 15a in position preventing it from twisting under pressure from the springs 22. Such twisting of the shoe 15a may cause the shoe

15a to jam in the channel section 9 as it is being installed and consequently by preventing such twisting assembly is made easier. It will be appreciated that such twisting of the sash shoe 15a is not a problem once the shoe 15a is
5 installed and attached to the sash 4 due to the load of the sash 4.

The finger extension 28 also provides a buffer zone to absorb the impact of the sash shoe 15a on the lower end of the spring support assembly 18a. Such impact may occur in
10 the event of excessive rapid opening and sliding of the sash 4 or if the sash 4, and so load on the sash shoe 15a, is suddenly removed from the shoe, for example during removal of the sash 4. This buffer action can be further enhanced by tapering of the recess 46 and/or finger extension 28 such
15 that they progressively engage and abut as the finger 28 is inserted into the recess 46. The recess surface 47, and/or finger outer profile surface 47, could also be serrated to increase the contact friction between them which further improves the impact absorbency. In an alternative
20 arrangement the positions of the finger 28 and recess 46 could be reversed with the sash shoe 15a including finger projections which engage within slots in the main body of the mounting. A suitably shaped mounting support 24' is shown in figure 9 with slots 48 defined between projections
25 49 from the main body 25 and the lower mounting projection 37. In a yet further variation, shown in figure 8, coil compression springs 50 are mounted on the lower end of the support mounting 24 and are arranged to axially abut against shoulders on the sash shoe 15a. It will be appreciated that
30 alternatively springs could be mounted on the sash shoe 15a. In this arrangement of figure 8 a finger projection could also be incorporated to locate the sash shoe 15a and spring assembly 18a.

As described the spring support mounting 24 is fixed
35 to and within the jamb 12 and the sash shoe 15a is, in use,

slidable within the channel section 9 and is attached to the sash 4. This is the preferred arrangement. It will be appreciated though that this arrangement could be reversed in other embodiments and the spring support 24 could be
5 slidably located within the channel section 9 of the jamb 12 and pivotally attached to the sash 4 with a fixed shoe. The vertical positions of the pivot pins 14a and tilt latches 16a could also be reversed with the pivot pins located at the top of the sash 4 and the tilt latch 16a towards the
10 lower part of the sash 4. Many other variations of the inventions will also be apparent to those skilled in the art and various combinations, and use of individual features of the various features of the different embodiments are contemplated.

CLAIMS

1. A sash window counterbalance spring mounting arrangement for fitment into a channel section within
5 a window jamb, comprising at least two coiled ribbon springs, a spring support mounting comprising support means for each of said at least two coiled ribbon springs to support and locate said coiled ribbon springs to the spring support mounting, and locating
10 means adapted, in use, to locate the spring support mounting within and to said channel section; characterised in that the spring support mounting comprises a single integral component from which the support means depend and from which the at least two
15 springs are located and supported.
2. A sash window counterbalance spring mounting arrangement as claimed in claim 1 in which the spring support mounting comprises an elongate plate like main
20 body portion, the main body portion having a front and rear surface.
3. A sash window counterbalance spring mounting arrangement as claimed in claim 2 in which the support
25 means comprise integral projections from a rear surface of the main body portion.
4. A sash window counterbalance spring mounting arrangement as claimed in claim 3 in which the support
30 means for at least one of the at least two springs comprises a pair of triangular cross section integral projections which extend from the rear surface of the main body portion, the triangular cross section projections respectively disposed laterally on the rear
35 surface with the respective triangular cross sections

laterally oppositely directed such that the pair of triangular projections define a cradle for said spring.

5. A sash window counterbalance spring mounting arrangement as claimed in any one of claims 2 to 4 in which an end portion of the main body portion is curved in a direction extending from the rear surface of the main body such that a tip edge of the end portion of the main body is disposed at a position spaced from a plane of the remainder of the main body portion, the end portion providing a curved head portion for the spring support.
6. A sash window counterbalance spring mounting arrangement as claimed in claim 5 in which, when the mounting arrangement is installed within said channel section of the window jamb, the tip edge of the curved head portion is arranged to abut against a wall of said channel section with the curved head portion closing of an end of the mounting arrangement and, in part, providing said location means for locating the spring support mounting within the channel.
7. A sash window counterbalance spring mounting arrangement as claimed in claim 6 in which the tip edge of the curved head portion is arranged to resiliently abut against said wall of the channel section such that the spring support mounting is urged away from said wall.
8. A sash window counterbalance spring mounting arrangement as claimed in any one of claims 2 to 7 in which said location means comprise, in part, wing projections extend from the front surface of the main body of the spring support mounting, a distal end of

the wing projections arranged when the spring mounting is installed within the channel to abut against a wall of said channel and to space the front surface of the main body of the spring support mounting from said channel wall.

9. A sash window counterbalance spring mounting arrangement as claimed in claim 8 in which the wing projections are disposed towards the lateral sides of the front surface of the support mounting.

10. A sash window counterbalance spring mounting arrangement as claimed in any preceding claim in which on the longitudinal end of the support mounting there are inter engagement means for cooperative engagement with cooperative inter engagement features on a sash shoe.

11. A sash window counterbalance spring mounting arrangement as claimed in claim 10 in which the inter engagement means comprise a finger extension which is arranged to be engaged within a cooperative recess.

12. A sash window counterbalance spring mounting arrangement as claimed in claim 11 in which the finger extension extends from an end of the spring support mounting, and the cooperative recess is defined in an end portion of the sash shoe.

13. A sash window counterbalance spring mounting arrangement as claimed in any preceding claim in which support means are disposed on the spring support mounting such that the at least two springs are located close to each other such that when in a coiled state an outer profile of adjacent springs almost touch.

14. A sash window counterbalance spring mounting arrangement as claimed in claim 13 in which the support means are disposed on the spring support mounting such that in use when the at least two springs recoil rapidly an outer surface of adjacent springs contact each other.
15. A sash window counterbalance spring mounting arrangement as claimed in any preceding claim in which an end of the spring support mounting comprises a buffer means for absorbing, in use, an impact of a sash shoe against said end of the spring support mounting.
16. A sash window counterbalance spring mounting arrangement as claimed in claim 15 in which said buffer means comprises coil tension springs.
17. A sash window counterbalance spring mounting arrangement as claimed in claim 15 in which said buffer means comprises a finger extension which is engaged within a recess, said extension and recess profiled such that as the finger extension is inserted into the recess the finger extension and recess progressively and increasingly frictionally engage each other.
18. A sash window counterbalance spring mounting arrangement as claimed in any preceding claim in which the spring support mounting is resiliently flexible in directions extending from the front and rear surfaces.
19. A sash window counterbalance spring mounting arrangement as claimed in any preceding claim in which the spring support mounting is plastic.

20. A sash window counterbalance spring mounting arrangement as claimed in any preceding claim in which the lateral width of the spring support mounting corresponds to that of the channel section such that when the spring support mounting is fitted into the channel section edges of the spring support mounting locate the spring support mounting laterally within the channel section.
21. A sash window counterbalance spring mounting arrangement as claimed in claim 19 in which the spring support mounting is fabricated by injection moulding.
22. A sash window counterbalance spring mounting arrangement for fitment into a channel section within a window jamb, comprising at least two coiled ribbon springs, a spring support mounting comprising support means for each of said at least two coiled ribbon springs to support and locate said coiled ribbon springs to the spring support mounting, and locating means adapted, in use, to locate the spring support mounting within and to said channel section; characterised in that an end portion of the spring support mounting comprises a curved head portion, with a tip edge the curved head portion arranged, when the mounting arrangement is installed within said channel section of the window jamb, to abut against a wall of said channel section with the curved head portion closing of an end of the mounting arrangement and, in part, providing said location means for locating the spring support mounting within the channel.
23. A sash window counterbalance spring mounting arrangement for fitment into a channel section within a window jamb, comprising at least two coiled ribbon

5 springs, a spring support mounting comprising support means for each of said at least two coiled ribbon springs to support and locate said coiled ribbon springs to the spring support mounting, and locating means adapted, in use, to locate the spring support mounting within and to said channel section;

10 characterised in that said location means comprise, in part, wing projections which extend from a front surface of the spring support mounting, a distal end of the wing projections arranged when the spring mounting is installed within the channel to abut against a wall of said channel and to space the front surface of the main body of the spring support mounting from said channel wall.

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24. A sash window counterbalance spring mounting arrangement for fitment into a channel section within a window jamb, comprising at least two coiled ribbon springs, a spring support mounting comprising support means for each of said at least two coiled ribbon springs to support and locate said coiled ribbon springs to the spring support mounting, and locating means adapted, in use, to locate the spring support mounting within and to said channel section;

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25 characterised in that on a longitudinal end of the support mounting there are inter engagement means for cooperative engagement with cooperative inter engagement features on a sash shoe.

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25. A sash window counterbalance spring mounting arrangement for fitment into a channel section within a window jamb, comprising at least two coiled ribbon springs, a spring support mounting comprising support means for each of said at least two coiled ribbon springs to support and locate said coiled ribbon

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springs to the spring support mounting, and locating means adapted, in use, to locate the spring support mounting within and to said channel section; characterised in that the support means are disposed on the spring support mounting such that in use when the at least two springs recoil rapidly an outer surface of adjacent springs contact each other.

26. A sash window counterbalance spring mounting arrangement for fitment into a channel section within a window jamb, comprising at least two coiled ribbon springs, a spring support mounting comprising support means for each of said at least two coiled ribbon springs to support and locate said coiled ribbon springs to the spring support mounting, and locating means adapted, in use, to locate the spring support mounting within and to said channel section; characterised in that an end of the spring support mounting comprises a buffer means for absorbing, in use, an impact of a sash shoe against said end of the spring support mounting.

27. A method of mounting sash window counterbalance springs to a sash window jamb using a sash window counterbalance spring mounting arrangement as claimed in any preceding claim.

28. A sash window counterbalance spring mounting arrangement as hereinbefore described with reference to figures 1 to 10.

29. A method of mounting sash window counterbalance springs to a sash window jamb as hereinbefore described with reference to figures 1 to 10.

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INVESTOR IN PEOPLE

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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): EIJ: JFA.

Int Cl (Ed.7): E05D: 13/00.

Other: Online: EPODOC, JAPIO, WPI.

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2295634 A (BRAID) - see integral support, figure 4.	1 at least
A	GB 2278626 A (BRAID)	
A	GB 2254875 A (BRAID)	
X	GB 1505782 A (FOSTER) - see integral support, figures 2, 4 & 5.	1 at least
X	GB 0329996 A (MANTZ) - see integral support, figures 1-5.	1 at least
X	US 5661927 A (POLOWINCZAK et al.) - see integral support, figure 3.	1 at least
X	US 4961247 A (LEITZEL & SNYDER) - see integral support, figures 1-3.	1 at least
X	US 4953258 A (MENNUTO) - see integral support, figures 1-4.	1 at least
A	US 4227345 A (DURHAM)	
X	US 2635282 A (TRAMMELL) - see integral support, figure 2.	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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